8-1-70

GENERAL SPECIFICATION FOR CONDUIT INSTALLATION

All conduits shall be installed in conformance with the plans and the following requirements: trenches provided for Department installed facilities shall also conform to these requirements.

1.00 CONDUIT

1.10 The size and type of conduit shall be as shown on the plans and in conformance with UGS-100

1.20 All conduits shall be carefully aligned and laid to a uniform grade with no abrupt changes in grade or direction.

1.30 A minimum cover is required over all conduits or cables. This cover is measured from the top of the conduit to finished surface grade and varies according to voltage and type of system. The minimum cover requirements are listed below.

Minimum Cover required	Type of system
24"	Conduit for circuits to 750 volts
36"	Conduit for circuits over 750 volts
43"	Direct buried cables and cable-in-conduit (C.I.C.)

Cover over conduits or cables located within curbed streets shall be measured from the top of the conduit to the gutter flow line.

1.40 Conduits that are cracked, damaged or contain any roughness that would damage the cables shall not be installed.

1.50 To prevent floating, conduits requiring concrete encasement shall be securely tied down prior to pouring concrete.

2.00 CONDUIT TERMINATIONS AND CONNECTIONS.

2.10 All conduits shall terminate in substructures with plastic end bells unless conduit run is 50 feet or less. Metal conduits may be terminated with insulated grounding bushings provided departmental approval is obtained.

2.20 Conduit couplings shall be staggered a minimum of six(6) inches from each other coupling. This requirement does not apply to plastic conduit.

3.00 EXCAVATION

3.10 The contractor shall obtain a street opening permit from the City of Riverside, Public works Dept. prior to excavating in any public right-of-way. He shall also comply with the Construction Safety Orders of the Division of Industrial Safety of the State of California and all other applicable laws, ordinances and regulations.

3.20 Excavations shall be fully protected against hazard to the public and shall be braced to prevent caving. Proper protective measures shall be used where excessive caving is encountered or where protection is required for adjacent structures or roads.

3.30 The Department reserves the right to specify when protective measures for excavations must be employed.

3.40 Contractor shall provide walkways and/or roadways around and over excavations to safely accommodate traffic along streets and into adjacent buildings.

3.50 Trench bottoms shall be made stable and brought to uniform grade with soil compaction of at least 90%.

3.60 Rocks shall be removed to a point six inches below the trench bottom and the duct structure or cables laid on a bed of compact sand or native fill as specified by the inspector.

3.70 Special care shall be taken to prevent damage to existing buried structures and facilities. Contractor shall assume responsibility for proper notification and restitution to interested parties in the event of damage to such structures and facilities.

4.00 GROUND WIRE

4.10 The size, type and location of ground wires shall be as shown on the plans and when shown shall be furnished and installed by the contractor.

5.00 CONCRETE ENCASEMENT

5.10 The type and location of concrete encasement or cap shall be as shown on the plans and in conformance with UGS-125, 125.1 and 125.2

5.20 Concrete shall not be poured without prior notice and approval of the Department Inspector.

5.30 Concrete shall have the following minimum proportions:

Water content sufficient to provide slump of:
Minimum slump 2"
Maximum slump 4"
Minimum fine aggregate content:
Sand in % of total by weight 40%
Maximum size coarse aggregate 3/8"
Minimum cement content:
Pounds per cubic yard 190
Sacks per cubic yard 2

Compaction shall be by any suitable means which assures elimination of voids and does not damage the conduit.

Add one of the following mixtures in proportions not to exceed the manufacturers suggested dosage rate.

Zeecon H
Zeecon R
Pozzolith 300 N
Plastocrete 161

Admixtures that contain calcium chloride are not acceptable.

No artificial color is required.

6.00 BACKFILL AND DENSIFICATION

6.10 Backfilling operations shall not be undertaken without prior notice and approval of the Department Inspector. All backfill and compaction within street right-of -way shall be inspected, tested and approved by the City of Riverside, Public Works Department.

6.20 The contractor shall proceed as soon as possible with backfilling operations. Care shall be exercised so that the conduit system will not be damaged or displaced. Sic inches of well-dampened earth shall be placed over systems with concrete protection two hours after the concrete is poured.

Eight inches of select backfill shall be placed over systems without concrete protection. The remainder of the trench may then be backfilled. Rocks greater than six inches in any dimension will not be permitted in any trench backfill and rocks greater than 2.5 inches in any dimension will not be permitted in backfill placed within 12 inches of pavement subgrade. Where rocks are included in the backfill, they shall be mixed with suitable excavated materials so as to eliminate void.

In areas too rocky to provide suitable backfill, the contractor shall provide screened earth or slurry sand as specified by the Department Inspector. After the placing of backfill has been started, the contractor shall proceed as soon as possible with densification.

6.30 DENSIFICATION METHODS

6.31 MECHANICALLY COMPACTED BACKFILL. Backfill shall be mechanically compacted by means of tamping rollers, sheepsfoot rollers, pneumatic tire rollers, vibrating rollers, or other mechanical tampers. All such equipment shall be of a size and type approved by the Department Inspector. Impact-type pavement breakers (stompers) will not be permitted over existing clay, asbestos cement, cast iron and non-reinforced concrete pipes or non-encased electric conduit systems.

Permission to use specific compaction equipment shall not be construed as guaranteeing or implying that the use of such equipment will not result in damage to adjacent ground, existing improvements, or improvements installed by the contractor. The contractor shall make his own determination in this regard.

Material for mechanical compacted backfill shall be placed in lifts, which prior to completion, shall not exceed the depths specified below for the various types of equipment:

a) Impact, free-fall, or "stomping" equipment--maximum lift depth of three feet.
b) Vibratory equipment, including vibratory plates, vibratory smooth-wheel rollers, and vibratory pneumatic-tired rollers--maximum lift depth of two feet.
c) Tolling equipment, including sheepsfoot (both vibratory and non-vibratory, pneumatic-tired (non-vibratory), and segmented wheels -- maximum lift depth of one foot.
d) Hand-directed mechanical tampers--maximum lift depth of four inches.

Mechanically compacted backfill shall be placed in horizontal layers of depths (not exceeding those specified above) compatible to the material being placed and the type of equipment being used. Each layer shall be evenly spread, moistened (or dried if necessary), and then tamped or tolled until the relative compaction specified on page 8 has been attained.

6.32 WATER DENSIFIED BACKFILL

As used in these specifications, flooding shall mean the inundation of backfill with water puddled with poles or bars to insure saturation of the backfill material for its full depth. Jetting shall be accomplished by the use of a jet pipe to which a

hose is attached carrying a continuous supply of water under pressure.
Unless otherwise specified or authorized all backfill to be densified by water shall be jetted. Backfill shall be densified until the relative compaction specified on page 8 has been attained.
Densification by flooding or jetting shall be subject to all of the following requirements:

1) The contractor shall apply water in a manner, quantity and at a rate sufficient to thoroughly saturate the thickness of the lift being densified.
2) Where densities are required which cannot be obtained by flooding or jetting along, the inspector may direct the contractor to supplement the flooding or jetting process with the application of vibrating compacting equipment to the backfill.
3) The lift of backfill shall not exceed that which can be readily densified by the jetting or flooding procedure, but in no case shall the undensified lift exceed 10 feet for flooding or 15 feet for jetting.
4) Where the nature of the material excavated from the trench is generally unsuitable for densification with water, the contractor shall import suitable material for flooding or jetting, or densify the excavated material by other methods.
5) The contractor shall make his own determination that the use of flooding or jetting methods will not result in damage to existing improvements. Permission to use such methods in densifying backfill shall not be construed as guaranteeing or implying that adjacent ground and improvements will be unaffected.
6) Backfill material that has a sand equivalent of less than 20, when tested in accordance with ASTM-D-2419 shall be mechanically densified in accordance with Sect. 6. 31 and shall not be densified with water.

7.00 RESURFACING

7.10 Reference to subsections below refer to the Standard Specifications for Public Works Construction, 1970 Edition, copies of which are available from the City of Riverside, Public Works Dept.

7.20 Unless permanent pavement is placed immediately, temporary bituminous resurfacing two inches thick shall be placed and maintained at locations determined by the Department Inspector wherever excavation is made through pavement, sidewalk or driveways. In sidewalk areas the temporary bituminous resurfacing shall be at least one inch thick At major intersections and other critical locations, a greater thickness may be ordered. Temporary resurfacing shall be placed as soon as the condition of the backfill is suitable for permanent resurfacing.

The bituminous mixture used for temporary trench resurfacing shall conform to Class D, Fine and Stockpile in the table for Type II Asphalt Concrete in Subsection 203-6.3.1; and bitumen conforming to Grade SC-800 liquid asphalt in the Slow Curing Products Table, Subsection 203-2.4.

The mixture may be furnished from stockpiles or directly from the plant mixer and may be laid cold, at the option of the contractor. The resurfacing shall be placed, rolled, maintained and removed and disposed of by the contractor.

7.30 PERMANENT RESURFACING. Unless otherwise specified in the plans, all surface improvements damaged or removed as a result of the contractor's operations shall be reconstructed by the contractor to the same dimensions, except for pavement thickness, and with the same type materials used in the original work. Trench resurfacing shall be one inch greater in thickness than existing pavement.

Subgrade for trench resurfacing shall conform to Section 301 and the pavement reconstruction shall comply with the applicable provisions of Section 302. Resurfacing shall be performed within two weeks after the placement of temporary resurfacing. Resurfacing within Public Right-of Ways shall be inspected and approved by the City of Riverside, Public Works Department.

8.00 MANDRELLING, CLEANING AND PULLROPE INSTALLATION

8.10 The contractor shall pull a mandrel, furnished by the Department, through all installed conduits. The mandrel O.D. shall be 1/4 inch less than the conduit I.D.

8.20 All mandrelling must be done in the presence of the Department Inspector.

8.30 All cement, sand , and foreign matter shall be removed from conduits. If obstructions are found which cannot be removed by cleaners so as to pass the specified mandrel, the conduit shall be removed and relaid at the contractor's expense.

8.40 A 3/16 inch diameter polyethylene or polypropylene pullrope, with a minimum breaking strength of 700 pounds, shall be left in each conduit. A three foot length of rope shall be left projecting from the conduit at each substructure, or looped back into the duct and adequately secured in place where a plug or cap is installed. An equivalent pullrope, if approved by the Department, may be substituted.

8.50 All pullrope shall be new; used ropes are not acceptable.

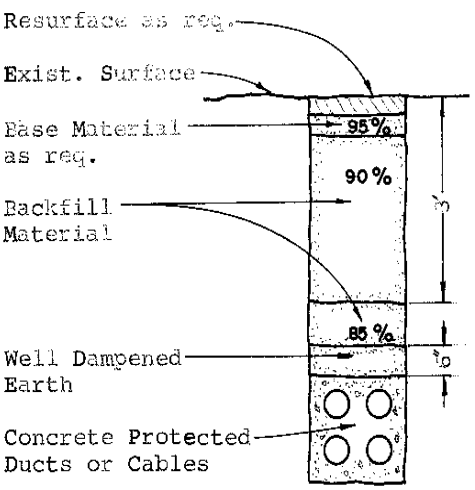
Latest Revision-Complete Revision

8-1-70

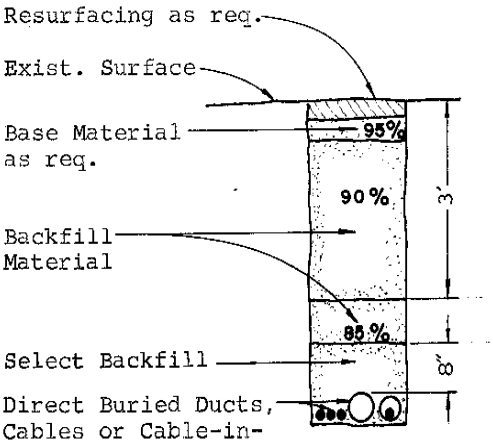
RIVERSIDE PUBLIC UTILITIES DEPT. - UNDERGROUND STRUCTURES

TRENCH BACKFILL DETAILS

Within Street Right-of-Way

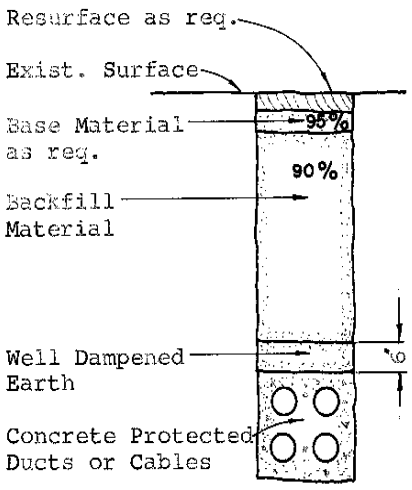


CONCRETE PROTECTED

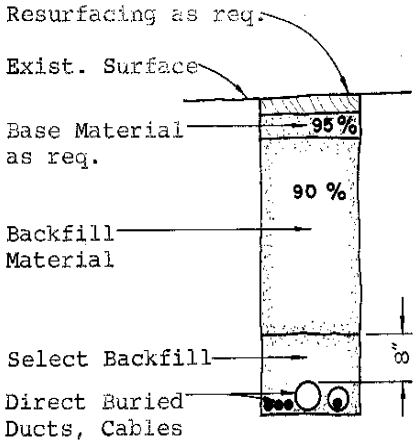


DIRECT BURIED

Private Property



CONCRETE PROTECTED



DIRECT BURIED

NOTES:

1. All percentage figures shown indicate percent of relative compaction.
2. Trench bottoms shall be compacted to 90% relative compaction.
3. Duct Bank requirements per UGS-125. C.I.C. and Direct Buried Cable requirements per UGS-125.2.

7/24/70

Approved: Chief Utility Engineer

UGS-100.1